



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/081,074	02/21/2002	Sergey Lopatin	P1406	2324

7590

09/16/2003

LaRiviere, Grubman & Payne, LLP  
P.O. Box 3140  
Monterey, CA 93942

EXAMINER

FOONG, SUK SAN

ART UNIT PAPER NUMBER

2823

DATE MAILED: 09/16/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/081,074

Applicant(s)

LOPATIN, SERGEY

Examiner

Suk-San Foong

Art Unit

2823

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 17 June 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-10 and 21-30 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-10 and 21-30 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 21 February 2002 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

### DETAILED ACTION

1. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

#### *Claim Rejections - 35 USC § 112*

2. Claims 1-10 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.
3. Claim 1, lines 9-10, it question what is recited through "completing formation of the semiconductor device". It is suggested that "; and completing formation of the semiconductor device" should be deleted. In view of applicant's arguments on page 8, lines 18-25, of the amendment filed 6/17/03, it remains unclear what steps are recited. Although the claims are read in light of the specification, limitations of the specification are not read in the claims.
4. Claim 1, lines 2 and 7-9, it is unclear what thickness is recited through the term "thin". The term "thin" in claim 1, lines 2 and 7-9, is a relative term which renders the claim indefinite. The term "thin" is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention.

Art Unit: 2823

5. Claim 3, line 3, claim 5, line 3, claim 6, line 3 and claim 7, line 3, it appears that “essentially” should be deleted. It remains unclear what is recited because the instant specification contains no guidelines and examples that are considered sufficient to enable one of ordinary skill in the art to draw a line between impurities. In response to applicant’s argument that the term appears in over 3000 patents, it is well-established that each application stands on its own merits.

6. Claim 23 contains the trademark/trade name RE-610™. Where a trademark or trade name is used in a claim as a limitation to identify or describe a particular material or product, the claim does not comply with the requirements of 35 U.S.C. 112, second paragraph. See *Ex parte Simpson*, 218 USPQ 1020 (Bd. App. 1982). The claim scope is uncertain since the trademark or trade name cannot be used properly to identify any particular material or product. A trademark or trade name is used to identify a source of goods, and not the goods themselves. Thus, a trademark or trade name does not identify or describe the goods associated with the trademark or trade name. In the present case, the trademark/trade name is used to identify/describe wetting agent and, accordingly, the identification/description is indefinite. (MPEP 2173.05(u)).

7. The use of the trademark RE-160 has been noted in this application. It should be capitalized wherever it appears and be accompanied by the generic terminology.

Although the use of trademarks is permissible in patent applications, the proprietary nature of the marks should be respected and every effort made to prevent their use in any manner which might adversely affect their validity as trademarks.

Art Unit: 2823

8. Applicant's argument with respect to "the volume" in claim 4 is rendered moot by the amendment of claim 4 in the amendment filed 6/17/03.

***Claim Rejections - 35 USC § 103***

9. Claims 1-10, 21, 22, 24-28 and 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Alling et al. ('847) in combination with Mahneke ('926), Kowalski ('635) and Krishnamoorthy et al. ('533).

Alling et al. is relied on for the teachings discussed in the rejections of paragraph 13 of the Office Action mailed on 4/9/03.

In regard to claim 4 and claim 6, the step recited in lines 7-8 and 6-7, respectively, would be obtained as the same materials are being treated the same as the instant invention; as previously stated.

Alling et al. does not disclose rinsing the copper-zinc alloy thin film in a solvent as recited in claim 1, line 8.

Alling et al. does not disclose drying the copper-zinc alloy thin film under a gaseous flow as recited in claim 1, line 9.

Mahneke is relied on for the teachings discussed in the rejections of paragraph 13 of the Office Action mailed on 4/9/03 as providing motivation to enable the formation of the copper-zinc alloy film of Alling et al. to be performed and obtain further advantage of preventing contamination on both surfaces of the wafers.

The combination process does not disclose that the chemical solution includes deionized water.

Art Unit: 2823

Kowalski is relied on for the teachings discussed in the rejections of paragraph 13 of the Office Action mailed on 4/9/03 as providing motivation to enable the step of admixing the chemical solution with a volume of water of the combination process to be performed.

The combination process does not disclose that at least one zinc ion source is comprised of at least one zinc salt selected from a group as recited in claim 3, lines 3-8.

The combination process does not disclose that at least one pH adjuster comprised of at least one pH-adjusting compound selected from  $\text{NH}_4\text{OH}$  or TMAH as recited in claim 7.

The combination process does not disclose that the zinc content in copper-zinc alloy layer 40 is in a concentration range of less than 1 atomic %.

With respect to claim 30, the combination process does not disclose at least one complexing agent is comprised of ethylene diamine (EDA).

Krishnamoorthy et al. is relied on for the teachings discussed in the rejections of paragraph 14 of the Office Action mailed on 4/9/03 as providing motivation to enable the formation of the chemical solution of the combination process to be performed and obtain further advantage of solving the diffusion and self-passivation problems in metallization structure (Krishnamoorthy et al., Col. 3, lines 1-5), and as follows.

It would have been within the scope to one ordinary skill in the art to combine the teachings of the combination process with Krishnamoorthy because it would enable formation of the complexing agents of the combination process to be performed.

One of ordinary skill in the art would have been motivated to arrive at selected concentration range for the pH adjuster for use in the process of the combination through routine

Art Unit: 2823

experimentation depending on the desired reaction rate because chemical concentration is recognized to be a result effective variable; as previously stated.

One of ordinary skill in the art would have been motivated to arrive at selected concentration range for the wetting agent for use in the process of the combination through routine experimentation depending on the desired reaction rate because chemical concentration is recognized to be a result effective variable; as previously stated. Furthermore, as previously stated, Alling et al. suggests at ¶[0045], last two sentences, that a concentration range of 0.1 to 20 g/L for the wetting agent as a suitable composition for tin. The disclosed range overlaps the recited range.

One of ordinary skill in the art would have been motivated to arrive at selected volume range for use in the process of the combination through routine experimentation depending on the desired device dimension and device characteristics; as previously stated.

10. Claim 23 is rejected under 35 U.S.C. 103(a) as being unpatentable over Alling et al. ('847) in combination with Mahneke ('926), Kowalski ('635) and Krishnamoorthy et al. ('533) as applied to claims 1-10, 21, 22, 24-28 and 30 above, and further in view of Woodruff et al. ('524).

The combination process does not disclose that at least one wetting agent for stabilizing the chemical solution is comprised of RE-610™.

Woodruff et al. discloses that surfactants such as RE-610™ and PEG are used as surfactants in a copper plating solution for stabilizing the copper plating solution to control surface tension (Col. 3, line 64 to Col. 4, line 3).

Art Unit: 2823

It would have been within the scope to one ordinary skill in the art to combine the teachings of the combination process with Woodruff et al. because it would enable formation of the wetting agent of the combination process to be performed.

11. Claim 29 is rejected under 35 U.S.C. 103(a) as being unpatentable over Alling et al. ('847) in combination with Mahneke ('926), Kowalski ('635) and Krishnamoorthy et al. ('533) as applied to claims 1-10, 21, 22, 24-28 and 30 above, and further in view of Habulak ('056).

The combination process does not disclose that at least one zinc ion source comprises zinc dichloride ( $\text{ZnCl}_2$ ).

Habulak discloses zinc plating bath compositions which comprises complexing agents such as tartaric acid or EDTA,  $\text{NH}_4\text{OH}$  for adjusting pH value, soluble surfactants and at least one zinc salt such as zinc sulfate and zinc dichloride ( $\text{ZnCl}_2$ ).

It would have been within the scope to one ordinary skill in the art to combine the teachings of the combination process with Habulak because it would enable formation of the second metal ion source of the combination process to be performed.

### ***Response to Arguments***

12. Applicant's arguments filed 6/17/03 have been fully considered but they are not persuasive.

13. Applicant argues that merely pointing out modifying Alling et al. according to teachings of Mahneke produces advantages is insufficient evidence of obviousness. However, the rejection



Art Unit: 2823

is based on the disclosure of Mahneke being useful in producing an electroplated metal alloy on a semiconductor wafer. It has been established that art recognized suitability for an intended purpose is indeed motivation to combine (MPEP 2144.07). The reference clearly discloses the suitability of treating the product as disclosed in Alling et al. Furthermore, the expectation of some advantages is the strongest rationale (MPEP 2144).

14. In response to applicant's argument based upon the age of the references, contentions that the reference patents are old are not impressive absent a showing that the art tried and failed to solve the same problem notwithstanding its presumed knowledge of the references. See *In re Wright*, 569 F.2d 1124, 193 USPQ 332 (CCPA 1977).

15. With respect to applicant's argument that a routineer familiar with Alling et al. would not be familiar with Kowalski, one of ordinary skill in the art is presumed to be familiar with all printed publications relevant in the fields of the claimed invention or analogous to the claimed invention.

16. Applicant misstates the basis of the rejection with respect to the teachings of Kowalski to be the usefulness of admixing the electroplating solutions of Alling et al. and Kowalski. Instead the basis of the rejection is the disclosure of Kowalski related to the use of DI water in a copper-zinc electroplating solution comprised of metal ions of copper zinc with respective metal salts and complexing agents or chelating such as EDTMP ligand and HEDP which suggests the usefulness of DI water as the source of water for the electroplating solution of Alling et al. which

Art Unit: 2823

comprises at least one copper salt such as copper acetate and sulfate in a concentration range of about 10 to 300 g/L, at least second metal ion source such as zinc, and other additives such as suppressors agents, leveling agents and etc.; wherein the chemical solution is admixed with a volume of water wherein the additives include complexing agents such as edetic acid (EDTA) and tartaric acid, and wetting agent such as polyethylene glycol.

17. Applicant argues that the teachings of Kowalski are related to using two complexing agents “teaches away from present invention.” However, the issue is whether the combination of references relied on suggests a process encompassed by the instant claims. The reference discloses the use of two complexing agents as an alternative or in combination in Col. 3, lines 25-29, and, therefore, fairly suggests modifying process of Alling et al. as argued. Furthermore, the claims are open to plural complexing agents.

18. Applicant argues there is no motivation to combine Krishnamoorthy et al. with Alling et al. It has been established that art recognized suitability for an intended purpose has indeed been recognized as motivation to combine teachings (MPEP 2144.07). The disclosure of Krishnamoorthy et al. of the usefulness of the disclosed metal salts as metal ion sources in an electroplating process using complexing agents comprised of ethylenediamine (EDA), EDTA, cyanide and etc. in a concentration range of about 20 to 40 g/L, additional agent such as wetting agent and a pH adjuster such as  $\text{NH}_4\text{OH}$  (ammonium hydroxide) for maintaining the solution between pH level in a range of about 8 to about 11 is evidence that the salts would be suitable for use as the metal salts of the process of the combination.

Art Unit: 2823

***Conclusion***

19. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Suk-San Foong whose telephone number is 703-305-0383. The examiner can normally be reached on Monday to Friday.


If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Olik Chaudhuri can be reached on 703-306-2794. The fax phone numbers for the organization where this application or proceeding is assigned are 703-308-7722 (7724, 3431, 3432).

Art Unit: 2823

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

8f

August 26, 2003

  
George Fourson  
Primary Examiner  
Art Unit 2823